

Dr James Hunter
1839-

OBSERVATIONS

ON

FOUL WATER IRRIGATION,

FOUNDED ON A

PERSONAL SURVEY OF DIFFERENT DISTRICTS OF THE
CITY, AND AN EXAMINATION OF THEIR COM-
PARATIVE SALUBRITY,

BEING A

REPLY TO CERTAIN STATEMENTS MADE AT A MEET-
ING OF THE TOWN-COUNCIL ON THE

2D APRIL, 1839.

BY

WILLIAM TAIT, SURGEON,
COMMISSIONER OF POLICE.

“Your breath I hate
“As reek of the rotten fens.”—*Shakspeare's Coriolanus*.
“All the infections that the sun sucks up
“From bogs, fens, flats, on Prosper fall, and make him
“By inch-meal a disease!”—*Shakspeare's Tempest*.

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OBSERVATIONS, &c.

THE subject of Foul Water Irrigation has of late attracted much attention, and excited no inconsiderable alarm in the minds of the inhabitants of this city. The evils, however, arising from this source, seem to us to have been greatly exaggerated, and hence we have deemed it not improper, however unpopular the attempt may be, to lay before the public a few plain statements of facts acquired by a personal visitation of the different districts situated to the east and west of the city where Irrigation is carried on to its greatest extent. At the same time, we will take an opportunity of comparing the general health of the inhabitants of these districts with that of those dwelling in other parts of the town; and especially with the health of those situated at the greatest distance from the irrigated lands. These statements, however, are not submitted for the purpose of vindicating or supporting the claims of the proprietors of these lands, or of reprobating the present attempt of the authorities to put a stop to the present system of irrigation. Our sole aim at present is, to elicit truth, and thereby endeavour to allay all that unnecessary apprehension on the part of the public, which the recent discussions may have created.

The line of argument pursued by those gentlemen who have expressed themselves against the salubrity of these artificial marshes, is, at first sight, we admit, very plausible and satisfactory; but, on a more careful examination, we discover that very few facts have been adduced in support of their position. It is argued, that because fever has prevailed to a much greater extent during the last year than it had done for the seven years preceding it, and as irrigated lands existed to the extent of several hundred acres around the city, therefore, irrigation is the cause of the increase of fever and disease; and that, before the latter can be remedied and prevented, the former must be removed. In support of the first proposition, the statistics of the fever cases admitted into the Royal Infirmary for the last eight years are given, which show a difference in favour of 1838 to the amount of 1017 cases, which is certainly an alarming increase. But when it is observed that the whole increase has taken place in one year, that none of the remaining six years amounted to that of 1831, and that there has not been a regular increase of fever corresponding with the increase of irrigation, and, more especially, as those inhabitants situated in the neighbourhood of these irrigated lands, have apparently not been more subject to disease than formerly, we are led to look elsewhere for the true cause of the malady. The difference of epidemics fully accounts for a greater number of cases one year than ano-

ther ; and had the statistics of fever been examined for twenty instead of eight years back, it would have been observed, that great discrepancies occur, and that no two years are the same. The difference in the number of cases of fever is not so great as in many other diseases, such, for example, as Scarlet Fever, Puerperal Fever, Cholera, Dysentery, Small-Pox, Measles, Hooping-Cough, Ophthalmia, and Influenza. In some seasons none of these diseases is observed, whilst in others, few people escape them ; this is more especially the case in regard to Influenza. It is impossible to determine the true causes of epidemics, or explain how they give rise to one form of disease one year, and to a different form another. Whether or not any one cause is sufficient to give a determinate form to the nature of a disease is not yet established—but atmospherical changes—the peculiar electrical state of the atmosphere and earth—unwholesome and deficient food—infection and contagion—are generally acknowledged to be active agents in the production of epidemics. It is impossible to say exactly to which of these causes the late epidemic is attributable. In 90 cases of fever which occurred in the eastern district of the city which we surveyed, 65 appeared to us to be traceable to contagion, thus leaving only 25 to be accounted for by the other causes of the epidemic. In the southern district the same proportion holds good. If we take the same proportion of cases that were received at the Infirmary, there remain only 747 to be accounted for as originating from other causes than contagion, and it is possible that the atmospherical vicissitudes of the present winter, the continued and severe storms of that of 1837–8, and the poverty to which many families were reduced in consequence of the want of work, the high prices and unwholesome nature of the food which thousands have been obliged to use, might aid, in no inconsiderable degree, to account for the rest. Were the records of the Infirmary the only assurance we had of the increase of fever, we could not rely entirely on them, as they are only a record of cases admitted there, and convey to us no idea of the actual number of cases which occur in the more respectable classes of society. Moreover, some years back, none but the truly necessitous would consent to be conveyed to the Fever Hospital. This prejudice is gradually dying away—and many will now express a wish to be taken there, who are perfectly able to remunerate a medical attendant for his services, and keep themselves comfortable at home, so that a very slight change in public opinion will account for a considerable proportion of that apparent increase in the number who applied for admission into the hospital.

The second proposition which is attempted to be supported is, that the irrigated lands which exist to a considerable extent around the city, are the cause of this increase of fever. Allowing Mr Drysdale, the principal speaker on this subject, full credit for his industry in searching for information, by consulting medical authorities, and otherwise, as also for his benevolent exertions in behalf of the public, we cannot disguise our opinion that he has completely failed in proving his position. It was necessary for him to show, *first*, that these lands are in reality in a worse

condition than they were when fever prevailed to a less extent (say ten or twelve years back); *secondly*, that fever prevailed to the greatest extent in the immediate vicinity of these lands, and became gradually less and less prevalent as the distance from them increased; and, *thirdly*, that it was the kind of fever generally produced by malaria or marsh miasmata; and, *fourthly*, that fever occurred at that season of the year when the conditions most favourable for the generation of miasm existed; *fifthly*, that the disease prevailed in a general, and not a sporadic form, amongst those living in the same neighbourhood, who were equally exposed to the influence of the miasm.* It is our purpose now shortly to inquire how far these five points are supported by facts, and how far they affect the question at issue, and are deserving of public attention.

1st. The improvement which has taken place in the meadow lands generally is too well known to require any comment. The drains to the east of the city have been much improved, and the foul water contained within narrower bounds than formerly. But as it will be argued, that the irrigation will more than counterbalance the good effects arising from any improvement which has taken place in other quarters, we do not mean to insist upon this topic as an important feature in the question in dispute. Granting, then, that no improvement has taken place in these meadows, that they are in as bad a condition as ever they were, or even worse, it is obvious, that disease produced by them ought to prevail to the greatest extent in their immediate neighbourhood. It holds good as a general law, that in diseases arising from malaria, those who are exposed to it in a state of concentration, are most liable to be affected; and that its effects become gradually less apparent on those living at a distance from it—and those living at the greatest distance from the place where it is originated, are most exempt from its effects. This might be amply illustrated by allusion to foreign reports; but as analogies lose their force in proportion to the distance from our own country, we prefer confining our illustration to facts, the truth of which any one can satisfy himself of without much difficulty—either by consulting the old inhabitants of the district to which we are about to allude, or referring to Dr Monro's paper upon the subject. There existed about 40 years ago, to the west of this city, a large tract of marsh land, extending from Easter Dalry to Ratho. Almost all the young men living at Gorgie, Corstorphine, Gogar, a village now extinct, Lennie Muir, &c., were attacked with intermittent fever, or ague, while the inhabitants of the surrounding villages were less liable to the disease, according to their distance from the marshy lands, and those living at Currie and Juniper Green were almost entirely exempt from it. It is no argument against this, that the inhabitants dwelling there become inured to its effects, or acclimated to the noxious exhalations, and so escape its influence. The fact that such did not take place in the district alluded to, is sufficient to contradict any

* Malaria and marsh miasm are used synonymously, and are meant to designate an active morbid agent in the production of an intermittent and remittent form of fever, but whose physical properties are entirely unknown.

such supposition. We do not attempt to deny, that people dwelling in marshes abroad are sometimes not liable to intermittent fever, while strangers going to reside there at once become affected with it. But as most of such cases are taken from the reports of our army in foreign countries, and as the circumstances of our troops in these parts differ materially from those of the inhabitants of a peaceful and prosperous city in this country, where the climate and other conditions vary considerably, we see no force in this analogy.

Allowing, however, that it is possible that the inhabitants situated in the centre of these marshes did become less liable to diseases arising from the miasm generated there than strangers, and that its effects might be experienced at a considerable distance, while those in the midst of it enjoy an immunity from it, we are disposed to consider this as assuredly the exception to the rule, and not the general rule itself. From the same army reports to which we have alluded, we learn that removal to a very short distance, yea, from the ground flat to the second flat of the barracks, was sufficient sometimes to put a stop to the disease. Were it even a fact that the inhabitants on the banks of the meadows became proof against the deleterious influence of this miasm, this argument would not extend to new comers, and they of course must become the victims of its virulence. Such, however, is not the case. At Drymills, situated in the very centre of the irrigated lands, many of the inhabitants are changed annually, and not a single fact has transpired to show that the *strangers are more liable to disease* than the oldest inhabitants, notwithstanding that such changes take place at that period of the year when irrigation is carried on to its greatest extent, and when disease ought to be most prevalent.

Comparative Salubrity of different Districts of the Town.—The only method of settling the question in dispute appears to us to be, to ascertain the important point, whether or not the neighbourhood of these marshes is more unfavourable to the health of the inhabitants than other parts of the city. The determination of this point is of too great importance in the discussion of the question to be overlooked, and no inconsiderable difficulties are in the way of its settlement. The absence of all records at the Infirmary, and every where else, of the district from which patients come, is a desideratum which we have in some measure supplied by a personal visitation to the districts of the east, west, and south of the city; and the result has turned out contrary to our prejudices and expectations. Were the exhalations from the lands alluded to of a highly deleterious nature, their effects must become apparent. The quantity of malaria generated by a surface of about 400 acres extent, must have had an alarming effect on the health of the inhabitants, and those especially dwelling on the south side of Canongate, South Back of Canongate, St. Ann's Yards, Abbey, Watergate, St. Ann's Brae, Clock Mill House, Comely Green, Restalrig, and Abbey Hill, to the east of the city; and Easter and Wester Dalry, Tyne Castle Toll, Slooken Drouth, Drymills, Colt Bridge, and New Murrayfield to the west, must have suffered se-

verely from its effects ; whilst those at a distance, such, for example, as Potterrow, Buccleuch Street, and Causewayside, must be nearly exempt from it. We do not, however, find this to be in accordance with facts. In our survey of these districts, we find, that in 964 families, which, if averaged at five members each, would amount to 4820 individuals, dwelling in the two districts to the east and west of the city, there has occurred, since January 1838, 90 cases of fever, out of which number 10 died. In the southern district, including Potterrow, Bristo Street, and all closes between these, Chapel Street, Wester Crosscauseway, Buccleuch Street, Hope Park End, Gifford Park, Sciennes, and West Causewayside, in 855 families, or population of 4275, we found that there had occurred, within the same period, 91 cases of fever, of which 16 proved fatal—thus showing, that the south side is more unfavourable to health than the neighbourhood of the irrigated lands ; and that fever, when it does occur, takes a more unfavourable form. So far as we have been enabled to form an opinion of that district extending from St. Mary's Wynd to Niddry Street, including all the closes between High Street and Cowgate, the proportion of fever cases, according to the number of the inhabitants, is considerably above that of the other districts, and the proportion of deaths also greater.

In making these surveys and calculations, we do not pretend to perfect accuracy.* The method pursued by us, in our investigations, was to call upon one person in a stair, and, after inquiring the time she had resided there, we put the necessary questions relative to the health of her own family, and then of the other families in the stair with whom she was acquainted ; and did any dwell there of whose circumstances she was ignorant, we waited upon that family and interrogated them ourselves. Whenever we heard from others of fever having occurred in any particular land, we were still more careful about our inquiries, and visited it personally, entering in our note case the kind of fever, the age and sex of the patients, the number of the same family affected with it, the result or termination of the case or cases, with any observations on the locality, or circumstances of the patients, which we considered worth recording. In the suburbs, the task of acquiring information was by no means difficult, as all that was wanted might be acquired from one person in a stair, or from a small shopkeeper at the bottom of it, who was generally found to know all that was going on for a considerable distance around. In the centre of the town the task is very arduous and unsatisfactory. The families in every flat have to be waited upon separately, as no one almost can give any account of his neighbour, many of them changing every few weeks, and few remaining over a twelvemonth.

* Since the above was written, we have, through the kindness of Mr. Paterson, the surveyor, been permitted to examine his books, and compare them with the results of our survey ; and although there is a slight difference in the number of families, amounting to about 7 per cent. on the whole, it is not so great as to affect materially the force of our argument.

If no objection, then, can be found to the manner of acquiring our information, the result tends to an opposite conclusion from that generally entertained, or, in other words, we have found *that the neighbourhood of the meadows is not more favourable to the production and propagation of fever, than those districts situated at the greatest distance from them.*

Can marsh miasm produce a continued form of fever?—The third proposition in the argument is, that miasm arising from these marshes ought to produce the same form of fever as the miasm arising from other marshes. It is a maxim in philosophy, that wherever the same causes are in operation, the same result always follows. So, if malaria be the result of certain and definite changes which take place in vegetable or animal matter, in combination with heat and moisture, it must always result when such changes take place in the same circumstances, and this malaria, on the other hand, acting as a specific and active agent in combination with other conditions, must always produce the same effects. If it be a fact, then, that miasm is generated by the marshes in Lincoln and Cambridgeshires, in England, in the Pontine marshes near Rome, and in those of Holland and in North and South America, and the evidence is too strong to entertain any doubt of the fact, and if it be also true, that it invariably produces ague or intermittent fever, then it follows, as a natural consequence, that if there be any analogy between these marshes and those around Edinburgh, the intermittent is the form which fevers caused by the latter ought to assume. While the marshes to the west of the city continued to exist, the miasm produced thereby caused ague only, a case of continued fever was very rarely seen, and when it did occur, it was never imputed to the miasm arising from the marshes. The same law holds good to the present day, where marshes to any extent continue to exist. Now, as the laws of nature continue unchanged, as no intermittent or remittent fever is known to be produced by these irrigated lands, we are led to infer that no miasm is generated there; and as continued fevers, so far as we know, are not caused by any marsh miasm, and as we have already shewn that it is not more prevalent in the vicinity of these marshes than other parts of the city, we are forced to conclude that the increase of fever depends upon some other cause. The opinions of those eminent authorities who reported to the Poor Law Commissioners, alluded to by Mr Drysdale at the Council Board, may be considered weighty evidence against such a conclusion; but no evidence, on the other hand, has been adduced to show that the irrigated lands are in a similar condition to those open gutters, overflowing ditches, pig styes, &c; and the fact of Typhus Fever appearing one year, Constipation another, and Ophthalmia a third, is the best proof we could bring forward in support of the opinion that different conditions existed, and that these diseases could not be imputed to these drains alone. Neither are we informed particularly whether these diseases were prevalent elsewhere in these particular seasons, nor the statistics of disease in other quarters alluded to, in order that the contrast might appear more remarkable.

It may be argued, on the other hand, that it may be all quite true, that *marsh* miasm does not produce continued fevers, but that *animal* miasm is an active agent in the production of that particular form of fever. This opinion, although countenanced by the high authority of Dr Southwood Smith, is only partially true. We have equal respect for all opinions, it matters not from what quarter they come, that come to us unsupported by facts. That miasm or effluvia, arising from a person *labouring under disease*, will produce disease in others, we readily admit; but that effluvia or gases arising from the *decomposition of animal matter* will have the same effect, remains to be proved. As the latter differ from the former in their nature and properties, so will they differ in their effects. The difference between animal miasm and putrefactive gases must be carefully observed. The former arise only from the body in a state of specific disease, and are never formed in the dead body. Putrefactive gases are not *per se* in any degree poisonous, but prove hurtful only by exciting disgust.* It was the opinion of the late Dr

* Dr Ferguson observes, "That at the town of Point au Pitre, Guadaloupe, which is situated amidst some of the most putrid marshes in the world, the stench of which is almost never absent from the streets, the place was far from being *uniformly* unhealthy. Strangers, however much they might be annoyed with the smell, often resorted to it with impunity. A fact of the same kind has been observed in the Island of Tobago. The principal fort and barrack of the colony has been placed immediately to the leeward of the Bacolette swamp, within the distance of half-a-mile, and the strong ammoniacal stench of its exhalations, even at that distance, often pollutes the barracks; but these are so far from producing fever at all times, that when I visited the white garrison there, they had been more remarkably *exempt* from that form of disease *for several years* than any other troops in the West Indies. I shall not multiply facts and illustrations of the same kind to prove that putrefaction and the matter of disease are altogether *distinct* and *independent* elements; that the one travels beyond the other *without producing the smallest bad effect*; and that, however frequently they may be found in company, they have no *necessary* connection."—*Trans. of the Royal Society of Edinburgh*, Vol. IX. p. 281-2.

"The atmosphere of the slaughter-house, though sufficiently disgusting to the nose, does not appear to be *at all injurious to health*. The mere odours of animal substances, whether fresh or putrid, are not *apparently hurtful*; indeed, they seem to be often *decidedly useful*. Consumption is remarkably rare among the men employed in the slaughter-house. If we see a phthetical youth in the fraternity, we shall generally find that his parents, aware of an hereditary disposition to consumption, brought him up to the business with the hope of averting this formidable malady. The atmosphere of the slaughter-house, imbued with a foreign admixture, is, moreover, less susceptible of those natural changes which produce epidemics. From this circumstance, butchers are less subject, than other trades, to Cholera and Dysentery. To the same favourable combination, we attribute their comparative exemption from diseases, considered as infectious or contagious."—*Thackrah on the Effects of Arts, Trades, and Professions on Health and Longevity*, p. 11.

Fletcher, a much respected lecturer on physiology in this city, 'that a person may live as well in an atmosphere containing the most putrid effluvia, as in a pure one.'

The truth of the above statement is strongly impressed upon us, from what we have seen in many of the closes in this city. For example, in many of those leading from the High Street to the Cowgate, every stair, every vacant apartment becomes the depository of every thing that is disagreeable and filthy. One flat alone, those who are curious upon this subject ought to visit, situated in Fowlis' Close, which, though far from being the most disagreeable either to sight or smell, which we have witnessed, is calculated to give a pretty fair idea of the extent to which dunghills within doors are sometimes carried. It occupies an apartment of about 10 or 12 feet square, and is divided into two parts by a narrow pathway, which leads to an apartment elevated a little above it, occupied by a poor family who are constantly exposed to its disgusting exhalations, and who, had its effluvia been highly prejudicial to health, must have fallen victims to it long ago. The ground flats and cellars are mostly occupied by swine, which contribute not a little to pollute the atmosphere in this confined place. However dirty and confined this close is, it is in many respects superior to Blackfriar's Wynd. Every attempt at a description of the latter would come so far short of the truth, that we must abandon it at the present, in the hope that some curious visitor will, at some future day, contrast its former splendour with its present filthy and wretched condition, and give an idea to the world to what stage misery and wretchedness may be brought. If health is to be found there, we wish no farther proof in support of our position, that odours and putrefactive gases are innocuous.

The same remarks which have been applied to animal, apply also to vegetable matter. It cannot be admitted, that marsh miasms are the *result of vegetable putrefaction*, as is generally supposed, but rather a *secretion of diseased vegetables*. If they did arise from putrefaction, they ought not to exist in salt marshes where no putrefaction takes place, and they ought also to be produced artificially, by putting vegetables under the conditions favourable to decomposition. This idea is countenanced by the fact stated by Dr Ferguson, that *paucity* of water, where it has previously and recently *abounded*, is the most favourable condition for the propagation of malaria; and no where could we expect sooner to find a diseased state of vegetables, than where the conditions favourable to a healthy vegetation become so suddenly and materially affected. The diseased secretion of plants may easily be conceived from that which is produced by the Upas, which poisons all animals that come near to it, and destroys all vegetable growth for a considerable distance around. Although these remarks may be considered irrelevant, they affect the present question most materially. We presume, that as we have no proof of the existence of miasm in the marshes in this city, its absence depends upon the healthy vegetation of these irrigated lands; but it becomes an important question, how far a dry and hot season may affect or

alter the condition of these lands and conduce to a diseased vegetation, and thereby to the production of a remittent or intermittent form of fever? The temperate nature of our climate, and the constant repetition of the irrigation, may probably prevent any such unfavourable occurrence, although this occurrence is still possible.

The season of the year at which fever is most prevalent.—The season of the year at which fever is most prevalent in Edinburgh, is also unfavourable to the supposition that it is produced by the irrigated meadows. The table brought forward by Mr Deuchar at the discussion on this subject in the Physical Society, shews most satisfactorily that most cases of fever occur in the months of November, December, and January, and that the smallest number occur in July and August, generally the driest and warmest months in the year.* In our own table, we find that in the 90 cases which occurred in the eastern district of the city, 13 were in November, 17 in December, 12 in January, thus leaving 48 cases to be divided among the remaining nine months of the year, of which number 15 occurred in July, which so far disagrees with Mr Deuchar's table, and invalidates our argument. It must be recollected, however, that Mr D's table is taken from the result of nine years, and the other extends no farther back than January 1838, and that the difference is entirely accidental, and can be explained in the following manner:—All the 15 cases occurred in one dirty confined close in Canon-gate. The fever originated in a member of a very poor family, and extended from one to another, till no fewer than 9 had been affected by it. Before any of this family were fully recovered, several members of a family residing in the same stair were also seized, after which it extended its ravages into the next stair, and did not stop till 29 cases had occurred in the same close. The regular succession of the attacks plainly shows that contagion must have been the principal agent in the production of most of the cases in this close, and fully accounts for a greater number of cases in the month of July than appears from the table of Mr Deuchar. The months of June, July, and August, are the principal months of the year for irrigation; and as it appears to be a fact, that fewer cases of fever occur in these months than any other, with the exception of April, we are led to infer, that irrigation in no way conduces to the propagation of fever. The argument that has been advanced against this, that marsh miasms are more frequent and severe in the

*MR. DEUCHAR'S TABLE.

February (9 years)	810	August, (9 years)	678
March, "	845	Sept. "	783
April, "	701	October, "	888
May, "	749	November, "	1090
June, "	712	December, "	1176
July, "	631	January, "	1166

autumnal than the summer months, may be obviated in the following manner:—The effects produced by miasms are the only proof we have of their existence. If it be true, then, that miasms may be latent in the system for weeks or months together before their effects appear and we believe it to be so far true, and if their effects begin only to appear in autumn, then it must follow as a legitimate conclusion, that the system must have received it in summer, which is still in favour of the summer as the period when miasms are most apt to be generated. All experience, all authority, and all analogy are in favour of our proposition. In Rome, and all other countries where marshes abound and intermittents prevail, July and August are the two months of the year when they are most common. On examining the cases in M. Bailly's work; we find, at more than four-fifths occurred in these two months, and a great majority of them in July alone. Indeed, this fact is so well known, that travellers and strangers avoid visiting these parts at that season of the year. It is in warm countries and tropical climates that ague is experienced in its most severe form; and summer is the only period when there can be any analogy between the temperature of this and foreign countries, and when, of course, miasms ought to exist. But as it has been shown that fever instead of being most prevalent in these months here, is least so, we are forced to conclude, that its increase is in no way referrible to the irrigation which is carried on around the city.

Fever not so general as to warrant a belief in its origin in miasm.—It must also be apparent, that were marsh miasm the cause of the fever which prevails here, it ought not only to be in the neighbourhood of the meadows, but also more general among the population there, than it has yet appeared to be. It is contrary to all that is yet known of the effects of malaria, to suppose that it would only affect one at Abbeyhill, another in Croft-an-righ, and a third in the Canongate, and pass over all the other inhabitants dwelling in Comely Green, St Ann's Yards, &c. At Walcheren, and other places, where our troops have suffered severely from the effects of malaria, those dwelling upon particular parts of ground, or on duty at particular stations, were very generally, and in some instances almost all seized with the disease. In like manner we would be led to suppose, that the inhabitants of the Abbeyhill, South Back of Canongate, &c. would be seized nearly at the same time, and that fever would be very general. The cases which have occurred, however, do not countenance any such supposition. They have almost all appeared in a sporadic form, and gradually spread to other members in the same family, and to other families in the same land, and very seldom extended to a second tenement. In Reid's Close, for example, it was confined to two families who were related to each other—in Bull's Close, it was confined to two adjacent lands—in the Horse Wynd, several families in one large tenement, called Brodie's Land, were affected successively, in such a way as proved beyond a doubt that contagion was the cause of it—in one land in the lowest and dirtiest part of Croft-an-righ, several families were

affected in a similar manner—in Abbeyhill, two brothers were seized, one after the other, and all the members of one of their families—in a house, 76, Watergate, all the members of the family on the ground flat had fever, and those who occupied the upper flat, and who, in passing to their apartments, had to pass through the apartments of those on the ground flat, were all subsequently affected with the disease. In the 90 cases already alluded to, five single or sporadic cases only occurred, all the others were confined to several members of a family, or to different families in the same land. It occurred in the same manner in the south side. It appeared in different lands at the same time, and often at a considerable distance from each other, and almost never extended beyond a single tenement. This clearly points out the necessity of a separation between the sick and the healthy. Had the first person who was affected been carried to the hospital, and the apartment completely cleaned, ventilated, and fumigated, it is probable that no additional cases would have occurred. A fortnight or so generally elapses after the first case appears before a second occurs, and then not unfrequently several members of a family will be seized within a short period of each other, and also others in the same stair. This is the more evident from the fact, that several of the single or sporadic cases were immediately removed to the Infirmary, and no more cases occurred in the same family or land, although the the circumstances of the people, and the condition of their dwellings, appeared sufficiently favourable for the spread of fever. Had these precautions been attended to in all the other cases, it is very possible that, instead of 90 in the eastern district, there might not have been above 20, if they had even amounted to that number; and, on the same mode of calculation, less than 700, instead of 2242, patients might have required admission into the hospital, which, besides saving the funds, would have avoided many of the inconveniences to the medical attendants and nurses which a crowded state of the wards gives rise to, and contributed very considerably to the comfort of the patients themselves.

Upon a review of the whole, we are led to the following conclusions:—

1st, That fever is not more prevalent in the neighbourhood of the irrigated lands than in other parts of the city.

2d, That it is contrary to general experience to expect disease caused by any miasm arising from these lands to be more prevalent at a distance than in their immediate vicinity.

3d, That the continued form of fever which generally prevails in Edinburgh, is not the form of fever which is generally produced by marsh miasm.

4th, That fever does not prevail to its greatest extent at that season of the year when the condition of the meadows is most favourable for generating malaria.

5th, That fever does not prevail so generally in the families living near to the marshes, as would lead us to suppose it was caused by anything of a local nature, to which all were equally exposed.

In the discussions which have taken place at the Council Board and the different meetings which have been held throughout the Town, the various speakers have, without exception, confounded two very different things ; or in other words, not taken sufficient care to distinguish between a *natural marsh* and *artificial irrigation*. In the preceding observations, we have made use of the terms indiscriminately, in order to accommodate our remarks to the sense in which the terms were used on other occasions, although we were fully convinced that there was some misapprehension as to their true meaning. Irrigation is never required to expedite vegetable growth in a marshy district, which requires rather an opposite mode of cultivation to insure a healthy vegetation. Natural marshes are generally acknowledged to be unhealthy, and on that fact all the observations rest which have been made against the irrigated lands around Edinburgh. It must, however, be remembered, that nothing but coarse and unpalatable aquatic plants grow there, and that the water is for the most part stagnant ; whereas in irrigation, the water is brought over the land in a current so gentle, as not to injure the feeblest plant, or endanger the tearing up of the soil ; and is carried off the surface so perfectly, that scarcely a drop becomes stagnant, and it thus becomes “ covered with a conspicuous verdure of the sweetest grasses.” After full enquiry, we are prepared to state, that no more sickness prevails on the estates of those gentlemen who have, within the last 30 years, floated a part of their lands, than what prevailed at the period previous to the commencement of irrigation. It is true that few have had opportunities of irrigating with the water from the common sewers of large towns ; but near to Crieff and Maybole, where foul water irrigation was first tried in Scotland, and is continued to the present day, there has not been the smallest trace of any increase of fever or other disease. The probability is, that as the sub-soil must be very porous, or the lands completely drained before any advantage can be derived from irrigation, there is no analogy between a natural marsh and lands thus cultivated—and this difference in their nature ought never to be lost sight of when speaking of the evils resulting from them.

From the observations of Mr Drysdale, we are led to infer that fever has decreased in almost every large town, with the exception of Edinburgh—“ that in none has it of late years been a formidable epidemic—and in several of them it is entirely unknown.” This we consider a very partial view of the subject ; for it is a notorious fact, that fever has increased greatly in several large towns during the last two years. In Glasgow, for example, there were admitted into the Hospital in 1836, 3125 cases, and in 1837, 5387, being an increase in one year of 2262 cases—being 20 cases more than were admitted into the Edinburgh Infirmary altogether. The number of fever patients treated by the district surgeons in their own houses in 1836, were 716, and in 1837, 2320, being an increase of 1604. The following table will give an idea of the gradual increase of fever in Glasgow in Hospital, district, and

private patients, and shew to the inhabitants of Edinburgh good grounds for congratulating themselves on the salubrity of their city—

In 1835,	there occurred	6,180
1836,		10,092
1837,		21,800

It is unnecessary to offer any comment on the above tables. The facts speak for themselves. The gradual increase of fever in Edinburgh can be compared with the increase of fever in Glasgow, and then it will be seen whether or not Mr Drysdale was justified in making such observations. The latter table is computed from the number of deaths which occurred from fever, on the assumption that 1 in 15 of those attacked in 1835 died; 1 in 12 in 1836, and 1 in 10 in 1837, which calculations are considered to be correct.

When the question of irrigation is viewed in the light of a public nuisance which cannot be longer tolerated, those who are desirous of its removal, have more particular claims on the support and co-operation of all the inhabitants of this city. Every thing that is disagreeable or offensive either to the prejudices or senses of the populace, ought, if possible, to be removed, particularly if the interests of others are not greatly involved. The proprietors of the meadow lands can lose nothing by their improvement, as they may still continue a source of considerable revenue in the form of gardens and nurseries, which would, at the same time, beautify and ornament the suburbs of the city. It ought, however, never to have been discussed as a question affecting the health of the community, without sufficient proof of its truth. It ought to have been remembered, that although an excellent method for arousing the people to a sense of the evils which surrounded them, it was also calculated to frighten; and that it may be discovered when too late, that inconsiderate assertions have caused many to leave, and prevented others from making Edinburgh a place of residence. This is an occurrence which not only affects the proprietors of houses, but all the commercial interests of the city. Amongst the nuisances which exist, the irrigation is not in our opinion the greatest. The different police dunghills around the city are much more deserving the attention of the authorities, and as they are completely within their own control, why do they allow them to remain so near to the public entrance to the town, as if their odour and appearance were objects of attraction for strangers, or as if to form a contrast to the many fine objects afterwards to be witnessed within it? When the attention of the public has been attracted to nuisances, it is hoped they will not relax in their zeal for improvement, till every one of these disgusting depots is removed to a greater distance, and away from the sides of the roads, and till every close, and every stair where filth is accumulated, shall be daily visited by the scavenger. The careless and slovenly manner in which the duties of the scavenger are frequently performed in some of the wynds and closes of the city, where the public eye is not present to criticise, is truly disgraceful; in the very places, too,

where cleanliness ought to be most attended to, as they are deprived of the free and refreshing circulation of air which the streets and open parts of the town enjoy. In that stair in Bull's Close, Canongate, where so many cases of fever occurred, there is a place at the foot of it where ashes and other refuse are daily deposited, and it is impossible to say how much this might have contributed to the spread of fever in this quarter. Is it not the duty of the Cleaning Committee to look after this kind of nuisance? is it consistent with their knowledge that such nuisances exist? is it with their sanction that the dung collected in the High Street and other parts is conveyed to depots situated in Blackfriar's Wynd? and that many of the back courts leading from that wynd are in such a state of filth, that it is almost impossible to breathe in them. If ignorance is the cause of the existence of such nuisances, our hints may be the means of remedying them; if intention or neglect is the cause, some one must be deserving of censure, and the public have a right to complain. Every one accustomed to inhale the polluted atmosphere of these confined and dirty closes, would consider it a privilege to be permitted to breathe that of the irrigated meadows.

14, *Drummond Street,*
May 6, 1839.